

During Pliocene time a large alluvial fan or delta accumulated on the Coastal Plain and lower parts of the Piedmont where the Potomac emerged from the higher land. Later, the margin of the continent was uplifted to such an extent that the seashore lay along or below the edge of the continental shelf. This uplift of the land may have taken place by stages sufficiently distinct to cut terraces in the Pliocene delta of the Potomac. During this high stand of the continental margin, the valleys now occupied by Chesapeake Bay, Delaware Bay, and the submarine valley of the Hudson were eroded. We may picture the Potomac River of late Pliocene time as very similar to the present river from its headwaters to Little Falls. At Little Falls it probably dropped as much as 60 feet. From Georgetown to its junction with the Susquehanna it was a normal Coastal Plain river—deep, fairly rapid but with no falls—flowing in a broad valley between gravel-capped uplands.

Then came a time of widespread crustal instability. The continental margin between Cape Cod and Cape Hatteras was depressed, the greatest depression being near the submarine channel of the Hudson. When this movement ceased the Pleistocene epoch had begun.

Since the beginning of the Pleistocene the land has remained stationary but the sea has fallen and risen upon it. The opening of the Pleistocene finds the sea at a height of 265 feet above its present level. Nearly all the Coastal Plain in this vicinity was submerged except an island covered with Pliocene gravel which rose 40 feet above the water southeast of Washington. Tides extended up the Potomac almost to Harpers Ferry. The Brandywine terrace was formed at this time. The flat-topped ridge southeast of Baileys Crossroads is a remnant of the Brandywine terrace.

Then came the Nebraskan glaciation; the tidal waters receded and the Potomac reoccupied its Pliocene channel.

After the Nebraskan ice had melted the Aftonian sea stood 215 feet above modern sea level. Tide probably extended up the Potomac to Point of Rocks. At Georgetown the river broadened and emptied into a bay about 7 miles wide with a prolongation extending northeastward towards Laurel. The Coharie terrace was formed at this time. Mt. Pleasant and Meridian Hill Park are on the Coharie terrace.

The waters receded during the Kansan glacial stage but readvanced during Yarmouth time to the 160-foot level. Tide reached above the dam at Great Falls. All of Washington below Florida Avenue was again under water, but the northeastern prolongation of Potomac

Bay was considerably smaller than its earlier stage. The Sunderland terrace was formed at this time. The shore line of the Sunderland terrace follows the bluff north of Florida Avenue between Eleventh Street and Connecticut Avenue.

During the Illinoian glacial stage the seas were again depleted and tidal waters drained away down the Pliocene course of the Potomac. When the ice had melted during the Sangamon interglacial stage, tides rose only about 95 feet above present sea level and extended up the Potomac only to the foot of Great Falls. Down-town Washington was again under water and Potomac Bay was not greatly altered. The terrace corresponding to the 95-foot stage is the Wicomico. Capitol Hill is an outlier of the Wicomico, and Dupont Circle, Scott Circle, Thomas Circle, and Iowa Circle are on the same terrace.

After the low water of the Iowan glacial stage, the water rose in Peorian time to an altitude of only 65 feet. Tides extended to the head of Stubblefield Falls and up the Eastern Branch to Berwyn. Capitol Hill made an island in Potomac Bay. The Chowan terrace was formed at this time. F and G streets, Lafayette Square, and Union Station Plaza are on the Chowan terrace.

Sea level fell in early Wisconsin time, but during the inter-Wisconsin retreat of the ice it rose again to an altitude of about 25 feet. At this time the Pamlico terrace was formed. Tides were stopped by Little Falls. Pennsylvania Avenue between Peace Monument and Fifteenth Street was flooded, and most of Southwest Washington except an island at the Department of Agriculture site was under water.

Late Wisconsin glaciation again lowered sea level, but at the beginning of the Recent epoch the water attained its present stage. Tides now extend to Little Falls and up the Eastern Branch to Bladensburg.

SUMMARY

The important conclusions of this paper are as follows:

The shore lines of the six Pleistocene terraces are horizontal as far as they have been traced. Horizontal terraces at the same altitudes have been noted in France and in South Africa. The shore lines are therefore interpreted as high-water marks made by a fluctuating sea upon stationary continents rather than as marks of a stationary sea made upon oscillating continents.

Glacial control of sea level is regarded as the dominant cause of the fluctuations of sea level during the Pleistocene epoch. Sea level was high during interglacial stages and low during glacial stages. The